

RECEIVED  
CENTRAL FAX CENTER

U.S. Patent Application Serial No. 10/665,204  
Response to OA dated June 28, 2007

SEP 27 2007

**AMENDMENTS TO THE CLAIMS:**

This listing of claims will replace all prior versions, and listings, of claims in the application:

**Listing of Claims:**

Claims 1 - 16 (Canceled)

Claim 17 (Currently Amended): A semiconductor light-receiving device for a high-speed and large-capacity optical fiber communication system comprising:

- a) a semi-insulating substrate;
- b) a semiconductor layer of a first conduction type that is formed on the semi-insulating substrate;
- c) a buffer layer of the first conduction type that is formed on the semiconductor layer;
- d) a light absorption layer that is formed on the buffer layer and generates carriers in accordance with incident light;
- e) a semiconductor layer of a second conduction type that is formed on the light absorption layer; and
- f) a high-concentration semiconductor intermediate tunneling layer of the first conduction type that is interposed between the buffer layer and the light absorption layer and has a higher impurity concentration than the buffer layer, the semiconductor intermediate tunneling layer allowing electrons to pass therethrough to the buffer layer due to a tunnel effect, wherein said semi-insulating

U.S. Patent Application Serial No. 10/665,204  
Response to OA dated June 28, 2007

substrate and layers b) - f) are arranged to form a semiconductor light-receiving device, the high-concentration semiconductor intermediate tunneling layer and the buffer layer being made of an identical material, and wherein the light absorption layer directly contacts the high-concentration semiconductor intermediate tunneling layer.

Claim 18 (Original): The semiconductor light-receiving device as claimed in claim 17, wherein the impurity concentration of the buffer layer is lower than  $1 \times 10^{17} \text{ cm}^{-3}$ .

Claim 19 (Previously Presented): The semiconductor light-receiving device as claimed in claim 17, wherein the high-concentration semiconductor intermediate tunneling layer has an impurity concentration of  $2 \times 10^{18} \text{ cm}^{-3}$ , and a film thickness of 100 nm or smaller.

Claim 20 (Previously Presented): The semiconductor light-receiving device as claimed in claim 17, further comprising a contact layer of the first conduction type that is interposed between the semi-insulating substrate and the buffer layer, the contact layer having a high impurity concentration, with a predetermined potential being supplied to the contact layer through an electrode connected to the contact layer.

Claim 21 (Original): The semiconductor light-receiving device as claimed in claim 17, wherein at least the light absorption layer and the semiconductor layer of the second conduction type

U.S. Patent Application Serial No. 10/665,204  
Response to OA dated June 28, 2007

form a mesa structure, with light entering the light absorption layer through a side surface of the light absorption layer that is exposed in a process of forming the mesa structure.

Claim 22 (Canceled)

Claim 23 (Currently Amended): A semiconductor light-receiving device for a high-speed and large-capacity optical fiber communication system comprising:

- a) a semiconductor substrate of a first conduction type;
- b) a buffer layer of the first conduction type that is formed on the semiconductor substrate and has a lower impurity concentration than the semiconductor substrate;
- c) a light absorption layer that is formed on the buffer layer and generates carriers in accordance with incident light;
- d) a semiconductor layer of a second conduction type that is formed on the light absorption layer; and
- e) a high-concentration semiconductor intermediate tunneling layer of the first conduction type that is interposed between the buffer layer and the light absorption layer and has a higher impurity concentration than the buffer layer, the semiconductor intermediate tunneling layer allowing electrons to pass therethrough to the buffer layer due to a tunnel effect, wherein said semiconductor substrate and layers b) - e) are arranged to form a semiconductor light-receiving device, the high-concentration semiconductor intermediate tunneling layer and the buffer layer being made of an

U.S. Patent Application Serial No. 10/665,204  
Response to OA dated June 28, 2007

identical material, and wherein the light absorption layer directly contacts the high-concentration semiconductor intermediate tunneling layer.

Claim 24 (Previously Presented): The semiconductor light-receiving device as claimed in claim 17, wherein the identical material is InP.

Claim 25 (Previously Presented): The semiconductor light-receiving device as claimed in claim 23, wherein the identical material is InP.